

REMARKS

In view of the above amendments and following remarks, reconsideration of the objections and rejections contained in the Office Action of March 25, 2003 is respectfully requested.

Initially, Applicants affirm the election of group I corresponding to claims 1-6 and 8. While these claims have now been canceled, all of new claims 9-20 correspond to the elected invention.

The Examiner's objections to the drawings are acknowledged. Substitute drawing sheets incorporating the changes required by the Examiner accompany this Amendment.

The Examiner's objections to the specification are acknowledged. This matter has been corrected. In addition, a number of minor editorial changes have been made and presented via the accompanying substitute specification. No new matter has been entered.

The Examiner's objections to the claims have been rendered moot by the cancellation of these claims. The Examiner's rejections of claims 6 and 8 as being indefinite has also been rendered moot by the cancellation of these claims. It is noted that the corresponding language in the new claims has been revised to correct the matters noted by the Examiner and to adopt the suggestion raised by the Examiner.

In the Office Action, the Examiner rejected claims 1-3 as being anticipated by Rantanen, U.S. 5,567,479. Furthermore, claim 5 was rejected as being unpatentable over Rantanen in view of Bordner, U.S. 5,283,121. Claims 1-4, 6 and 8 were also rejected as being unpatentable over Alheid et al., U.S. 4,245,582, in view of Rantanen. Claim 5 was further rejected as being unpatentable over Alheid et al. in view of Rantanen and in further view of Bordner. However, it is respectfully submitted that the present invention, particularly as now set forth in new claims 9-20, clearly patentably distinguishes over all of the references cited by the Examiner. The reasons for this will be discussed in detail below.

The present invention relates to a coating apparatus which may be used in a paper making machine for applying a coating liquid to the surface of a continuously traveling base paper. As discussed in the background of the invention, and described with respect to Figs. 5-8, such types of devices are conventionally known. However, as recognized by the present invention, fluctuations in film thickness can result in streaks of the coating liquid on the paper, resulting in that the finished

coated paper looks as if it has streaks on the surface. Thus a primary object of the present invention is to provide an apparatus which can provide high quality coated paper by restraining streaks from being formed on an applicator roll surface.

Noting Fig. 1, an applicator roll 2 for applying a coating liquid 14 to continuously traveling paper has the coating liquid supplied thereto by a cylindrical rod 10. A liquid supply head 3 is provided to supply the liquid to the nip portion between the cylindrical rod 10 and the applicator roll 2. The rod 10 is preferably rotatable, for example in a direction opposite to that of the applicator roll 2. A rod holder 7 mounted on the liquid supply head 3 holds the cylindrical rod 10.

Noting Fig. 2, the cylindrical rod 10 comprises a base material 10b provided with an irregular surface 10c for having a coating layer 10a applied thereto. More specifically, a surface treatment is applied to the base material 10b of the rod 10, i.e. to the outer surface of the rod, by roughing the surface of the base material 10b with a blasting method or by melting and jetting out a ceramic material to the base material 10b. Note the discussion on page 11 of the specification.

A coating layer 10a is then applied to the uneven outer surface of the cylindrical rod 10, the coating layer having a property of releasing the coating liquid 14. That is, the material of the coating layer can release the coating liquid 14 immediately even if it adheres thereto, i.e. is a material that is water repellant and also has a non-adhesive property with respect to the binder or co-binder component in the coating liquid 14. As discussed in the specification, silicon resin or fluorine-containing resin, for example, can be employed.

The surface treatment on the outer surface, preparing it for the coating layer, as discussed in the specification, can be by blasting or by melting and jetting out a ceramic material to the base material. This allows for the coating layer easily being formed on the base material. With the surface treatment, the coating layer is formed stably on the outer peripheral surface of the rod.

With the present invention as described, coated paper can be manufactured in which streaks can be eliminated from occurring on the film of coating liquid transferred to the paper. A first example described on page 19 beginning at line 10 forms a fine unevenness on the surface of the rod by blasting the rod, after which the surface-treated rod is coated with silicon resin. A second example described beginning at line 10 at page 20 employs a surface treatment of melting and jetting out a

ceramic material to the surface of the stainless base material, after which the surface is coated with silicon resin. Table 1 on page 22 compares the first and second examples of the present invention with the comparative example. While the first and second examples are slightly different from each other, it can be seen that they are both improvements over the prior art.

The original claims have now been canceled and replaced with new claims 9-20. Of these claims, 9 and 14 are independent claims which correspond generally to original claims 1 and 8. Claims 9 and 20 are independent claims which correspond generally to claims 9 and 14, but with slight differences.

More specifically, independent claims 9 and 14 recite that the cylindrical rod has an uneven outer peripheral surface that is formed by blasting the outer peripheral surface of the rod. Claim 9 further recites the coating layer formed on the uneven outer peripheral surface of the rod.

Independent claims 15 and 20 recite that the cylindrical rod has an outer peripheral surface with a fine unevenness that is formed by melting and jetting a ceramic material to the outer peripheral surface of the rod. Claim 15 recites the coating layer then formed on the outer peripheral surface with fine unevenness.

While it is acknowledged that the method of forming a structural feature of an apparatus claim may not ordinarily be limiting, to the extent that the method of forming a structure does not change the claimed structure, the present situation represents an exception. That is, unevenness formed by blasting forms a structurally distinct type of unevenness. Further, unevenness formed by melting and jetting a ceramic material forms a different type of structure on the outer peripheral of the cylindrical rod. And as can be seen from Table 1, the different structure resulting from the different ways of forming the uneven outer peripheral surface or fine unevenness on the outer peripheral surface can result in the rod having different characteristics in use.

The Examiner had cited both Rantanen and Alheid et al. as primary references in rejecting various of the claims. However, neither Rantanen nor Alheid et al. discloses a cylindrical rod which has an uneven outer peripheral surface or a fine unevenness on the outer peripheral surface of the cylindrical rod.

In rejecting claim 5, the Examiner cited the patent to Bordner as providing a fine uneven layer to facilitate bonding of a Teflon coating. However, each of the independent claims requires that the cylindrical rod have its outer peripheral surface be uneven, or have a fine unevenness. Bordner, by contrast, provides a separate non-porous textured melting coating 12 as an intermediate layer, formed on the bare metal of the cylindrical rod. The cylindrical rod according to the present invention does not require such intermediate layer, but rather forms the unevenness or fine unevenness on the outer peripheral surface of the cylindrical rod.

Furthermore, as recited in claim 9, the outer peripheral surface of the rod has its unevenness or fine unevenness formed by blasting, and then the coating layer is applied to the uneven or fine uneven outer peripheral surface of the cylindrical rod that has been formed by blasting. In Bordner, the coating layer is applied to the non-porous metal coating 12, and not the blasted surface of a cylindrical rod.

The same is essentially true for claim 15, but with respect to the melting and the jetting out of the ceramic material to the outer peripheral surface, and the formation of the coating layer on the fine unevenness formed thereby. Further, there is no disclosure of a cylindrical rod having outer peripheral surface with a fine unevenness formed by melting and jetting out a ceramic material as required by either claim 15 or 20.

Both claims 14 and 20 recite the rod holder as having a recess on a side of the rod holder that is opposite to the supporting hole. However, in the patent to Alheid et al., cited by the Examiner against corresponding claim language, the recess 26 cited by the Examiner as being opposite the support hole of Alheid et al. is in fact below the support hole of Alheid et al. This can be readily seen from Fig. 3. Nor is there a constriction between the supporting hole 20 and the recess 26. Rather, there is a substantial portion of the holder between the recess 26 and the support hole 20, only interrupted by conduits 38, for example for pressurized water. Claims 14 and 20 further distinguish over Alheid et al. for this reason.

With respect to Alheid et al, it should be further noted that the Examiner cites Alheid et al. as teaching a coating apparatus. Each of the claims requires a coating liquid supply for supplying the coating liquid to a nip surface portion between the first roll and the rod in which the coating layer is

formed. However, the coating liquid supply is not part of invention of Alheid et al. As the Examiner acknowledges, column 3, lines 15-18 state that the coating film 14 has already been deposited by a coating apparatus that has not been shown. Thus, the coating 14 has already been applied to the paper 12. Thus, Alheid et al. fails to disclose or suggest the coating liquid supply supplying the coating liquid to a nip surface portion between the first roll and the rod as required by each of the independent claims.

Thus, it may be readily seen that each of claims 9, 14, 15 and 20 patentably distinguish over each of Alheid et al., Rantanen and Bordner. Indication of such is respectfully requested.

All the remaining claims now present in the application depend from the above-discussed independent claims. Accordingly, it is respectfully submitted that all of the claims now pending in the application are clearly in condition for allowance over the prior art cited by the Examiner. Indication of such is respectfully requested.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance, and the Examiner is requested to pass the case to issue. If the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact Applicants' undersigned representative.

Respectfully submitted,

Masahiro SUGIHARA et al.

By: 

Nils E. Pedersen
Registration No. 33,145
Attorney for Applicants

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NEP/krl
Washington, D.C. 20006-1021
Telephone (202) 721-8200
Facsimile (202) 721-8250
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